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Effect of the crude oil composition on the oxidation behavior by high-pressure differential scanning calorimetry (HP-DSC)

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Abstract

© SGEM2018. Air injection technology is an effective method for enhanced oil recovery (EOR). The advantage of this method is that it can be used for different oil reservoirs, such as light oil, medium oil and heavy oil. The composition of crude oil has an important influence on the oxidation behavior. Therefore, it is necessary to study the oxidation behavior of different crude oils. Differential scanning calorimetry (DSC) has been widely used to investigate the oxidation process of different fossil fuel, such as, crude oil, shale oil, coal. In this research HP-DSC experiments were carried out to study the difference in oxidation behavior of different crude oils, including light oil and heavy oil. Generally, two obvious exothermic reaction intervals refer to the oxidation process were observed: low-temperature oxidation (LTO) and high-temperature oxidation (HTO). However, the oxidation behaviors of different oils are very different. For light oil, the LTO interval was more obvious than the HTO interval, and the highest heat flow in the LTO interval was much higher than the HTO interval. While, with the increase of the viscosity of the crude oil, the HTO interval becomes more significant. It is widely accepted that the coke combustion is the only important reaction in the HTO. An in-situ combustion process requires a strong HTO to sustain a stable combustion front in the reservoir. Therefore, the heavy oil is more suitable for in-situ combustion process as it has a stronger HTO reaction.

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Keywords

Air injection, Crude oil, Crude oil combustion, Oxidation

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